

SECTION II: Reprint of Broad Agency Announcement 06-48 “Hemispherical Array Detectors for Imaging (HARDI)”

Defense Advanced Research Projects Agency (DARPA), Contracts Management Office (CMO), 3701 North Fairfax Drive, Arlington, VA 22203-1714.

A - Hemispherical Array Detectors for Imaging (HARDI), SOL BAA 06-48, DUE 02122007, POC Dr. Devanand Shenoy, DARPA/MTO, FAX (571) 218-4932

PROGRAM OBJECTIVES AND DESCRIPTION

DARPA is soliciting innovative research proposals to develop Hemispherical Array Detectors for Imaging (HARDI) in the VIS-NIR-SWIR (400-1900 nm) spectral region. The ultimate vision for the program is to demonstrate a focal plane array integrated on a hemispherical surface that will enable high-performance imagers with a small form factor and field of view that far exceeds the state of the art possible with planar focal plane arrays. The program's end objectives are to demonstrate a focal plane array prototype that achieves a D-star greater than $10E13 \text{ cm} \cdot \sqrt{\text{Hz}}/\text{W}$ over a wide spectral range, a 1 cm radius of curvature with million pixels, a large 120 degree FOV, and a 60 Hz frame rate. Proposed research should investigate innovative approaches that enable revolutionary advances in organic and/or inorganic material systems with inexpensive, easily scalable processing methods. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

The objective of the HARDI program is to exploit the optical, electrical, and mechanical properties of both organic and inorganic semiconductor materials along with innovative processing methods to create compact, light-weight detection systems. The program goal is to develop new photo-detectors that will allow the use of fewer optical elements and eliminate the need for image post processing since the hemispherical planar array will inherently correct for spherical and other optical aberrations. The challenge to be addressed in this program is to achieve high photo-detector performance over a wide 400-1900 nm spectral band on a curved surface. Whereas, curved focal planes have been previously demonstrated with a radius of curvature ≥ 5 meters, this program seeks to develop curved focal planes with a radius of curvature down to 1 cm. The detectivity of such a curved focal plane array must be comparable to the performance of inorganic semiconductor planar arrays currently demonstrated in the NIR spectral region (using detectivity, D^* , as the relevant metric. This figure of merit was chosen because it is a normalized metric that is independent of unit area and bandwidth) with FOV that far exceed those of current systems. A FOV greater than 90° will allow for a simple optical design, which will in turn reduce the weight of the system. The improved functionality is very beneficial to many military

applications by replacing the need for multiple detectors or gimbals thus lessening the mechanical and optical complexity of the system normally required to achieve a wide field of view.

DARPA seeks innovative proposals in the following areas:

I. Technical Area One: Develop organic materials and processes required to fabricate a curved focal plane array consisting of photo-responsive materials that operate efficiently in the 400-1900 nm spectral range. These materials may be organic or organic/inorganic composites. In addition, research and development efforts will include novel materials and device processing technologies necessary to create a small form factor, hemispherical array with more stringent features.

II. Technical Area Two: Develop inorganic materials and processes required to fabricate a hemispherical focal plane array. The research and development in this area will exploit the performance of existing photo-responsive materials in the 400-1900 nm spectral range. Further, new technologies will be required to process inorganic semiconductor materials onto a hemispherical surface with the necessary performance parameters to achieve the end program goals. These materials could be amorphous inorganics that can be deposited and patterned on a hemispherical surface or alternately, inorganic structures prepared on a planar substrate and then transferred to a non-planar surface.

For both technical areas, a prototype with the following metrics will need to be developed:

(1) D-star ($\text{cm}\cdot\sqrt{\text{Hz}}/\text{W}$): greater than $10\text{E}13$, (2) Array size: million pixels, (3) Radius of curvature: 1 cm, (4) Fill factor: 80 percent, (5) Frame rate: 60 Hz, (6) Dynamic range: 60 dB, (7) Operability: 99 percent, (8) MTBF greater than 5000 h.

Additional information on these technology areas is provided in the Areas of Interest section of the BAA 06-48 Proposer Information Pamphlet referenced below.

PROGRAM SCOPE

Multiple awards are anticipated. Collaborative efforts/teaming are encouraged. Cost sharing is not required and is not an evaluation criterion but is encouraged where there is a reasonable probability of a potential commercial application related to the proposed research and development effort. The technical POC for this effort is Devanand Shenoy, fax: (703) 696-2206, electronic mail: Devanand.Shenoy@darpa.mil.

PROPOSER'S QUESTIONS

A "Proposer's Questions," website will be posted for BAA 06-48 on the DARPA, Microsystems Technology Office solicitations page (www.darpa.mil/baa/#eto). If you

would like to have a question answered and posted on this site, please send your question to the following address: BAA06-48@darpa.mil.

GENERAL INFORMATION

Proposers must obtain a pamphlet entitled “BAA 06-48, Hemispherical Array Detectors for Imaging, Proposer Information Pamphlet” which provides further information on areas of interest, the submission, evaluation, and funding processes, proposal formats, and other general information. This pamphlet may be obtained from the FedBizOpps website: <http://www.fedbizopps.gov/>, Grants.gov website: <http://www.grants.gov/>, World Wide Web (WWW) at URL <http://www.darpa.mil/> or by fax, electronic mail, or mail request to the administrative contact address given below. Proposals not meeting the format described in the pamphlet may not be reviewed. Proposers may submit electronically through Grants.gov or mail in hard copies. If submitting hard copies, please provide an original and three (3) copies of the full proposal and two (2) electronic copies (i.e., two (2) separate disks) of the full proposal [in PDF (preferred), or MS-Word readable, each on a single 3.5 inch High Density MS-DOS formatted 1.44 Megabyte (MB) diskette, a single 100 MB Iomega Zip (registered) disk, or a CD-ROM]. Each disk must be clearly labeled with BAA 06-48, offeror organization, proposal title (short title recommended), and Copy __ of 2. The full proposal (original and designated number of hard and electronic copies) must be submitted to DARPA/MTO, 3701 North Fairfax Drive, Arlington, VA 22203-1714 (Attn.: BAA 06-48) on or before 4:00 p.m., local time, Monday, February 12, 2006, in order to be considered during the initial round of selections; however, proposals received after this deadline may be received and evaluated up to one year from date of posting on FedBizOpps and FedGrants. Full proposals submitted after the due date specified in the BAA or due date otherwise specified by DARPA after review of proposal abstracts may be selected contingent upon the availability of funds. This notice, in conjunction with the BAA 06-48 Proposer Information Pamphlet, constitutes the total BAA. No additional information is available, nor will a formal RFP or other solicitation regarding this announcement be issued. Requests for the same will be disregarded. The Government reserves the right to select for award all, some, or none of the proposals received and to make awards without discussion. All responsible sources capable of satisfying the Government's needs may submit a proposal which shall be considered by DARPA. Input on technical aspects of the proposals may be solicited by DARPA from non-Government consultants /experts who are bound by appropriate non-disclosure requirements. Non-Government technical consultants/experts will not have access to proposals that are labeled by their offerors as “Government Only”. Historically Black Colleges and Universities (HBCUs), Minority Institutions (MIs), and Small and Small Disadvantaged Businesses are encouraged to submit proposals and join others in submitting proposals; however, no portion of this BAA will be set aside for these organizations’ participation due to the impracticality of reserving discrete or severable areas of research in hemispherical array detectors for imaging.

All administrative correspondence and questions on this solicitation, including requests for information on how to submit a proposal abstract or full proposal to this BAA, should be directed to one of the administrative addresses below; e-mail or fax is preferred. DARPA intends to use electronic mail and fax for correspondence regarding BAA 06-48. Proposals and proposal abstracts may not be submitted by fax or e-mail; any so sent will be disregarded. DARPA encourages use of the WWW for retrieving the Proposer Information Pamphlet and any other related information that may subsequently be provided.

EVALUATION CRITERIA

Evaluation of full proposals will be accomplished through a technical review of each proposal using the following criteria, which are listed in descending order of relative importance: (1) overall scientific and technical merit, (2) potential contribution and relevance to DARPA mission, (3) plans and capability to accomplish technology transition, (4) offeror's capabilities and related experience, and (5) cost realism. The administrative addresses for this BAA are:

Fax: (703) 351-8616 (Addressed to: DARPA/MTO, BAA 06-48),

Electronic Mail: BAA06-48@darpa.mil

Mail: DARPA/MTO, ATTN: BAA 06-48
3701 North Fairfax Drive
Arlington, VA 22203-1714

This announcement and the Proposer Information Pamphlet may be retrieved via the WWW at URL <http://www.darpa.mil/> in the solicitations area.